REMARKS

1. General

This paper is submitted in response to the Final Office Action mailed October 5, 2005 and the teleconference between Examiner Dionne Walls Mayes and applicants' attorney Walter M. Douglas.

Applicants have noted that the previous indication of allowability has been withdrawn. Applicants believe that in view of the amendments and comments submitted herewith the claims as amended are patentable over the art of record for the reasons stated below.

2. Claims

Claims 1-6 remain are currently pending in the application. Claim 1 has been amended herein as discussed with the Examiner. Specifically, the amendment to claim 1 made in applicants' previous response has been deleted and a wherein clause has been added that clarifies that the ion-exchange step occurs between the "cooling and shaping" step and the elevated temperature treatment.

The phrase deleted is:

> ". . . in which a metal that form a polarizing layer of the glass article is essentially omitted, the metal being selected from the group consisting of silver and copper, the glass batch . . ."

The wherein clause added is:

> <u>". . . wherein the ion exchange occurs after cooling and shaping the melt into an article and before subjecting the glass article to an elevated temperature treatment for a period of time sufficient to generate and precipitate silver or copper halide crystals in a surface layer of the glass</u>."

As discussed with the Examiner, applicants believe that the foregoing amendments clarify what is being claimed as the invention.

3. 35 U.S.C. §103(a) Rejection

Claims 1-6 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Takahashi et al., U.S. Patent No. 6,313,947. Applicants traverse the rejection.

A. The Rejection, page 3, Section 2, line 1 to page 4, line 6, states:

> "Takahashi disclosed nearly all that is recited in the claims, in that it discloses an initial glass batch, containing copper halides, which is melted and cooled to produce a glass article, after which it is reheated to develop copper halide crystals, after which it is stretched to elongate the copper halides into a prolate shape, after which the elongated glass is subjected to a reduction treatment to reduce a portion of all of the copper halide particles contained in the glass (see col.4, line 53-col.5, line 67). The claims differ from Takahashi et al in that Takahashi et al does not specifically disclose an ion-exchanging step. However, as admitted by applicant in the instant disclosure on page 8, ion-exchange has been used i the past to strengthen glass articles, particularly by replacing sodium ions with copper ions. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have incorporated an ion-exchange step, at some point in the process of Takahashi et al, in order to enhance the mechanical strength of the glass article produces in Takahashi et al.
>
> "Regarding claim 2, Takahashi indicates that almost all the copper halide particles are reduced to metallic, which means that there would be almost no copper halide crystals left to settle in the central layer-which would satisfy claim 2."

B. In addition to the foregoing Rejection, in the Office Action on Page 4, Section 3, line 3 to page 5, line 6, the Examiner comments:

> "Applicant argues that the Takahashi et al reference does not teach the amended claim recitation requiring the glass batch to be "essentially" free of silver and copper. Applicant asserts that since Takashi [*sic*] contains copper in the form of copper oxide and/or copper halides this limitation is not met, but the Examiner fails to find the logic in this assertion. if the glass batch cannot contain silver or copper 9of any form0, then it follows that the glass batch also cannot contain the halide that is capable of precipitating silver or copper halide - and this does not seem possible. Applicants requires, in claim 1, that the glass batch contain "a halide capable of precipitating silver or copper halide". "

The Examiner then continues and comes to the conclusion that applicants intended that the glass batch contain elemental copper (or silver). *This conclusion is incorrect* as will be shown in the Remarks made below.

C. **Remarks**

According to the present invention, silver of copper is ion-exchanged into a glass that contains halide ions but does not contain silver or copper ions. In Paragraph [00011] applicants cite several United States patents directed to the manufacture of polarizing glass elements by providing a silver halide-containing glass batch. The glass is then stretched and subjected to a reduction step to provide elongated silver metal particles in the glass. Continuing in Paragraph [00012], applicants state:

> "In the present invention, the "copper or silver" [*quotes added*] is omitted from the batch of the host glass, and after the batch is melted to make the base glass for the polarizing glass article, silver or copper is added to the glass article by ion exchanging silver into a surface layer of the glass."

Reading the two Paragraphs together, one skilled in the art would understand that what is omitted from the glass batches of the prior art is the silver halide. The glass batches of the invention contain halide ion, and copper or silver ions are exchanged into the glass by the ion-exchange. This is further stated in Paragraph [00012], lines 9-13 referring to the elimination of silver of copper halide in the central layer of the polarizer and also Paragraph [00013], lines 10-15.

The fact that the glass batches of the invention contain halide ion is supported by the specification in Paragraph [00014], lines 1-3, which state: "The glass batch can be formulated using standard glass-making materials including sand, alumina, oxides, carbonates and halides." A halide material is used in making the (base) glass material in order to insure that halide ions will be present in the glass for silver or copper halide as a result of the ion exchange step.

An example of what applicants mean can be illustrated using the glass compositions Takahashi et al. disclose in column 14, Table 1. Note that every glass composition disclosed by Takahashi et al. contains sodium chloride (NaCl). Using applicants teaching, one omits the CuCl from the Takahashi et al. glass compositions. The glass materials are melted and formed into an article. After the article is formed, the copper ions are added by ion exchange. If a higher chloride ion content than Takahashi et al. disclose is necessary, one skilled in the art would know that part of the Al_2O_3 in the Takahashi et al. formulations can be replaced by aluminum chlorhydrate ($AlCl_3 \cdot 6\ H_2O$; best known use to the public is as an antiperspirant, but also can be used in making glasses) to raise the chloride content. Table *III* of U.S. Patent No. 3,208,860 (cited in the specification in Paragraph [00013], line 4) also gives glass formulations in which not only sodium chloride is used, but also alumina hydrate ($Al_2O_3 \cdot 3\ H_2O$). One skilled in the art would know that part of the alumina

hydrate could be replaced by aluminum chlorhydrate in order to increase the chloride level.

The point of the foregoing remarks is that one does not have to include a copper or silver halide, or metallic copper or silver, in the base glass composition. These metals are supplied by the ion-exchange, and since halide is present in the base glass composition, the reductions step after elongation converts the silver or copper halide into the metallic metal (0) form. This ion-exchange procedure has several benefits. First, less metal is used to make the polarizing glass and the polarization-causing metal is located on the "surface" of the glass article. As stated in the specification and claims, the depth is les than 50 microns. As a result, particularly in the case of a silver-containing polarizer, the cost is reduced because less of this expensive metal is used. Second, locating the polarizing metal on the surface prevents, or greatly lowers, scattering that can be produced by phase-separated metal halide that may be present in the central portion of the polarizer as applicants have stated in Paragraph [0005]. Consequently, light transmission through the polarizer is higher than the case where phase-separated metal is present i the central portion of the polarizer.

Having gone through the foregoing analysis, applicants submit that the claimed invention is patentable over Takahashi et al. because Takahashi et al. does not teach or suggest (a) the use of a glass material containing a halide but no polarizing metals and (b) adding the polarizing metal to a halide containing glass by ion-exchange to form a metal halide followed by heat treatment, stretching and reduction of the metal to the metallic, metal(0) form to make the polarizer.

In addition, applicants submits that the remarks above has clarified that in the present invention no metallic silver or copper is added to the initial base glass formulation as the Examiner thought in the remarks quoted in Section B. The base glass composition initially contains no copper or silver in either ionic or metallic form. The metal is

D. Conclusion

Applicants submit that in view of the amendments and remarks made herein, applicants have shown that the claimed invention is patentable over the art of record.

Therefore, applicants submits that it is proper for the Examiner to withdraw the rejection of claims 1-6, as amended herein, and allow the application to proceed to issue.

Applicants believe that no extension of time is necessary to make this Response timely. Should Applicants be in error, Applicants respectfully request the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a) as necessary to make this Response timely, and hereby authorizes the Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

Applicants' attorney appreciates the time the Examiner spent in the telephone conference of December 2, 2005.

Please direct any questions or comments to Walter M. Douglas at 607-974-2431.

2 December 2005
Date

Respectfully submitted,
CORNING INCORPORATED

Walter M. Douglas
Registration No. 34,510
Corning Incorporated
Patent Department
Mail Stop SP-TI-03-1
Corning, NY 14831

CERTIFICATE OF TRANSMISSION UNDER 37 C.F.R. § 1.8

I hereby certify that this paper and any papers referred to herein are being transmitted by facsimile to the U.S. Patent and Trademark Office at 571-273-8300 on:

2 December 2005
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Walter M. Douglas — 2 December 2005
Date